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TRAPPING THE JAPANESE BEETLE

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CONTENTS

	Page
Value of traps	1
General information concerning traps	2
Description of one of the most satisfactory traps:	
Cylinder	2
Funnel and baffle	2
Bait container	4
Painting the trap	4
Description of one of the most satisfactory traps—Continued.	
Drainage outlet in beetle container	4
Cost of traps	4
Bait	5
Proper placing of traps	6
Removing beetles from traps	7

VALUE OF TRAPS

Large numbers of Japanese beetles may be caught and destroyed by the use of traps. The method is easy and inexpensive and thousands of traps have been used during the last five years in areas heavily infested by this pest. While the use of traps on individual properties will result in the destruction of great numbers of the beetles, this effort, unless generally supported in a community, will have very little effect on the infestation in the property concerned and may even increase infestation by attracting beetles from adjoining properties. It can readily be seen, therefore, that in generally infested areas community trapping is essential, and such effort may well result in the capture of millions of these destructive insects and in materially reducing local injury.

The use of traps is particularly valuable in isolated places of infestation. In such localities there is no danger of attracting beetles from the outside, and traps reduce the local beetle population by the number captured or collected near them. This may prevent an increase or may even result in a reduction in the infestation of the succeeding year.

To obtain the best results in trapping the beetle, it is essential to use good judgment in selecting traps and bait and to follow the directions for location and care of traps. One good trap properly cared for is worth several which are not cleaned and emptied when necessary.

Traps should not be depended upon to protect plants from the attacks of the Japanese beetle, as this protection is best achieved, at

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the present time, by sprays applied in accordance with the recommendations of the Japanese beetle laboratory of the Bureau of Entomology.

GENERAL INFORMATION CONCERNING TRAPS

A durable trap should be made of galvanized iron throughout, rather than of tin or black iron. Parts made of paraffined cardboard are very unsatisfactory, as a single rain will render them unfit for use. Generally speaking, traps having funnels with a diameter of 7 inches are more satisfactory than smaller traps, as they hold more bait and consequently capture more beetles. It is essential that the funnel fit snugly over the top of the cylinder. The color of the trap is very important, and one with a green cylinder and a white funnel and baffle will capture more beetles than will a trap painted any other color or combination of colors. In a cylindrical trap the bait container should be rigid and should slide in and out without binding. In addition, the sides of a circular bait container should be at least 1½ inches high to prevent the bait from being spilled. Some protection must be supplied so that the bait is not exposed to rain, as this will decrease its effectiveness very quickly. A baffle consisting of two pieces of material fitted together at right angles is more satisfactory than one consisting of only a single piece of metal attached to the top of the funnel.

DESCRIPTION OF ONE OF THE MOST SATISFACTORY TRAPS

A description of one of the most satisfactory traps (fig. 1) is given in the paragraphs that follow. Many of these traps are in general use at present. This trap, with the exception of a few minor details, was developed at the Japanese beetle laboratory. Figure 2 shows a cross section of the trap, with dimensions, and Figure 3 shows its unassembled parts.

CYLINDER

The cylinder is constructed of 30-gage dull galvanized iron and is 7 inches high, with a diameter of 7 inches. The top edge of the cylinder is curved outward. The sides are pierced by six holes three-sixteenths of an inch in diameter, 1 inch from the top and equidistant. The bottom also has six three-sixteenth inch holes which are equidistant and 1 inch from the outer wall. The screw top for a standard mason jar which forms part of the bottom is 2¾ inches wide and projects five-eighths of an inch into the cylinder. A hole, 2 inches in diameter, is punched in the center of this top. Two handle brackets are located three-fourths of an inch from the top of the cylinder. The bail handle, including a ¾-inch loop, extends 7¼ inches above the upper rim. The handle is made of 10-gage galvanized-iron wire. Copper wire bends too easily and ungalvanized material rusts too soon.

FUNNEL AND BAFFLE

The funnel and baffle are also constructed of 30-gage dull galvanized iron. The funnel is 7¼ inches in diameter at the top, three-fourths of an inch at the bottom, and is 7½ inches deep. Its upper

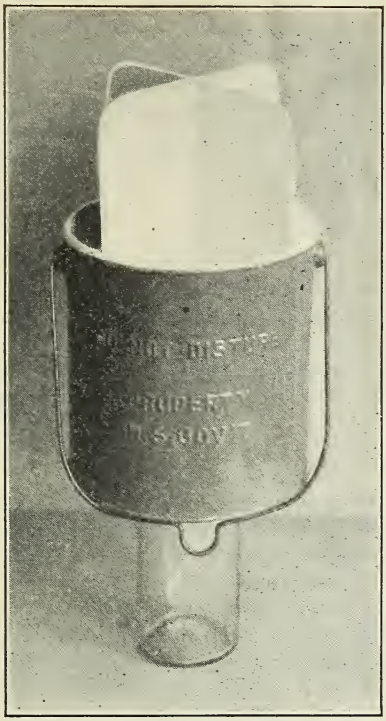

FIGURE 1.—Assembled Japanese-beetle trap with jar attached

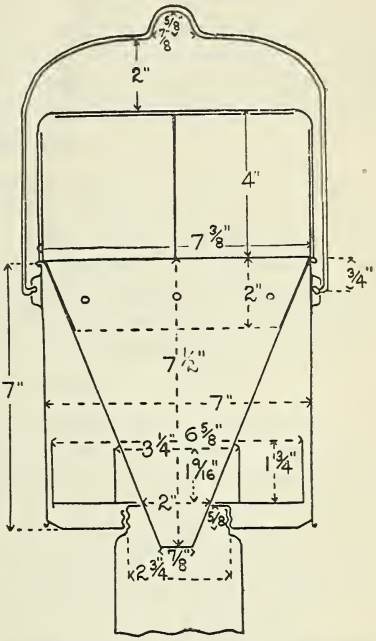

FIGURE 2.—Cross-section of Japanese-beetle trap, with dimensions

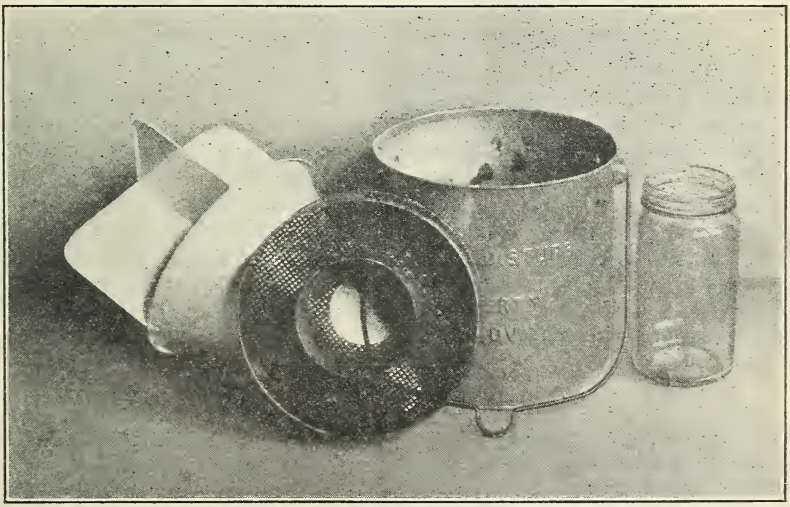

FIGURE 3.—Unassembled parts of the Japanese-beetle trap

edge is curled to fit snugly over the top of the cylinder. The baffle is 7⅜ inches wide, 6 inches high, and is formed by two pieces of material fitted at right angles. It extends 4 inches above and 2 inches below the top of the funnel. The edges of the baffle extending into the funnel fit snugly against the wall of the funnel, and the edges above the funnel are turned to avoid the danger of the operator being cut while handling the trap. The baffle is soldered or spot-welded to the upper edge of the funnel.

BAIT CONTAINER

The bait container is made of 30-gage block tin coated with a clear lacquer. It is 6⅝ inches in diameter and should slide freely in and out of the cylinder. The outer collar is 1¾ inches high, and the inner collar has a diameter of 3 inches and is $1\frac{9}{16}$ inches high. Both collars are soldered to the bottom of the container. The bottom is perforated with holes one-sixteenth of an inch in diameter and has a 2-inch hole punched in its center.

PAINTING THE TRAP

The exterior of the cylinder is painted green, light green being most satisfactory. Medium green may be used, but the darker shades should be avoided. The entire baffle and the inside of the funnel are painted white. Traps painted in this manner capture many more beetles than do traps painted entirely white or entirely green.

It has been found that newly painted traps which have a glossy surface capture more beetles than traps which have not been painted for one or more seasons. Because of this it is advisable to paint traps with a material which will give them an appearance as shiny as possible. Another desirable quality of a suitable paint is resistance to heat, without cracking or fading. One of the new commercial finishes used on automobile wheels is specially satisfactory in this respect.

DRAINAGE OUTLET IN BEETLE CONTAINER

The jar beetle container should have a small perforation in the bottom to permit the escape of water; otherwise it will soon fill up in wet weather. A process of making an outlet in the bottom of a glass jar has been developed at the Japanese beetle laboratory. By this method a slit is made in the jar by a 60-grain, 6-inch electrolon wheel one-sixteenth of an inch thick. This wheel cuts best when running at a speed of 10,000 linear feet per minute. To cut the slit it is necessary to hold the bottom edge of a jar against the wheel with moderate pressure while a fine stream of water is directed at the point where the cut is to be made. Water should always be used, otherwise the jar will crack immediately.

COST OF TRAPS

The trap described above is believed to be one of the most satisfactory now in general use, but many others are available and will capture beetles in considerable numbers. The retail price of traps varies considerably and depends upon the size and kind of material used in construction. The smallest traps sell for 10 cents, and the prices

range up to $2.50 for the more expensive types. The trap described usually retails for from $2 to $2.50 when purchased singly, with a considerable reduction when bought in quantity.

With reasonable care a substantially made trap will last for several years, and a number which have been employed at the Japanese beetle laboratory for six summers are apparently as good as new. Traps are on sale at practically all hardware and seed establishments in New Jersey and eastern Pennsylvania. They are also carried by numerous department stores in the Philadelphia area.

BAIT

Beetles are drawn to traps because the geraniol and eugenol which are present in the bait are attractive to them. The Japanese beetle laboratory has tested a great many substances as attractants for the beetle, but none has been found so attractive as a combination of the two mentioned above. Geraniol should not be confused with geranium oil, as the two substances are entirely different compounds, and the geranium oil is only slightly attractive to the beetle. Bait made in accordance with the specifications given below should be used, and substitutes should not be accepted.

Under ordinary conditions, one baiting of a trap is good for two or three weeks. If the bait becomes moldy because of excess moisture, it should be changed at once, and if part is spilled an amount equal to that lost should be added. Traps are rarely in use for more than eight weeks during the summer, and three changes of bait are usually sufficient.

The following formula is recommended for one baiting of the trap described. Any departure from this formula will result in a product less attractive to the beetle.

FORMULA FOR ONE BAITING OF THE TRAP DESCRIBED

Geraniol (at least 58 per cent pure)	15 grams	(4 teaspoonfuls).
Eugenol (U. S. P.)	1.5 grams	(½ teaspoonful).
Bran	75 grams	(1½ cups).
Water	13 cubic centimeters	(1 tablespoonful).
Molasses (good table grade)	39 cubic centimeters	(2½ tablespoonfuls).
Glycerine (chemically pure)	6 cubic centimeters	(1½ teaspoonfuls).

Total weight approximately 150 grams or one-third of a pound.

Certain traps have containers which hold only from 10 to 25 grams of bait. When bait prepared according to the above formula is used in such traps, it will be seen that only a very small quantity of geraniol and eugenol is present. This quantity of bait does attract beetles. The effectiveness of traps with small bait containers is greatly increased, however, by adding as much geraniol and eugenol to 25 grams of plain bait as is recommended for the larger quantity.

Bait prepared according to the above formula is made by a number of companies and individuals. It is usually sold in cans of various sizes, and many dealers provide sufficient material for one baiting with each trap. The use of traps in the heavily infested beetle area has become so widespread during the last few years that bait can be obtained readily, since many classes of stores handle

it. Material for one baiting of the trap described above usually retails for from 40 to 75 cents.

Some people prefer to make their own bait, and directions for its preparation are as follows: First add the water and glycerine to the molasses and shake vigorously. Then pour the liquid into the bran, stirring constantly. Add the geraniol and eugenol and stir until the bran is thoroughly mixed with the liquid.

Bait should be kept in a closed container and stored in a room free from dampness until used. It is obvious that the labor required in preparing bait for a number of traps is but little greater than that required to prepare it for one.

It is hardly worth while to mix bait at home for only one trap, but when several traps are operated at one time, the bait materials may be purchased in quantity, with a consequent saving. When the bait ingredients are purchased wholesale the cost of baiting a single trap is about 4 cents. The retail prices of the materials vary considerably, and when the ingredients are purchased in this manner one baiting of a single trap will cost about 20 cents. All materials for the bait are readily obtainable, with the exception of geraniol and eugenol, which can usually be obtained at chemical supply houses. Various grades of geraniol are on the market, and one of not less than 58 per cent purity should be used.

PROPER PLACING OF TRAPS

When traps are suspended in trees, the beetles that are attracted but not caught usually cause severe injury to the foliage by their feeding. This is true even if the foliage has been sprayed with lead arsenate. Many of the beetles which feed on the poisoned foliage die, but extensive foliage injury will result. It is, therefore, much better to place a trap 10 to 15 feet away from any foliage. When located in this manner, the trap tends to draw the beetles away from trees or shrubbery. Traps should not be placed on the ground, but should be suspended from a post or standard so that the top of the funnel is from 3 to 4 feet above the ground. A convenient standard is a $\frac{7}{16}$-inch iron rod 7 feet long with an 8-inch arm at the upper end. A ¼-inch hole is bored 1 inch from the outer end of this arm. The trap may be suspended by passing a wire hook through this hole and around the handle of the trap. A trap suspended in such a way is shown in Figure 4. The standard should always be equipped with an arm so that the trap will hang free and the beetles will not be blocked off on one side by the post. Suitable standards are usually sold by dealers who handle traps. The beetle is extremely fond of sunlight and will rarely enter a trap in the shade. For this reason traps should be located so that they are in the direct light of the sun for as many hours as possible.

Seasonal variation makes it impossible to set a definite date for placing traps in the field or removing them at the end of the summer. During the past several years they have been used effectively between June 25 and September 1 in the vicinity of Philadelphia. The best rule to follow is to place traps as soon as beetles appear and to allow them to remain as long as the insects are present.

REMOVING BEETLES FROM TRAPS

As beetles are very active during the day, it is best to remove them from a trap after 7 p. m. or before 8 a. m. because between these hours they seldom fly and very few are likely to escape. However, it is much easier to collect beetles in the daytime from a trap with a jar beetle container than from a trap of which the funnel and bait container have to be removed.

In collecting beetles from a trap with a jar container, simply unscrew the jar and quickly empty it into a pail which contains water and a small quantity of gasoline or kerosene, or very hot water alone. This will kill the beetles in a short time. If the beetles from several traps have been emptied into a pail, the mass should be stirred to insure wetting all the beetles. The container should be kept covered until the insects are dead. A trap which is not equipped with a jar container is best emptied by placing the trap on the ground and then removing the funnel and bait container. The beetles may then be emptied into a pail. This can be done rapidly by striking the sides and bottom of the cylinder.

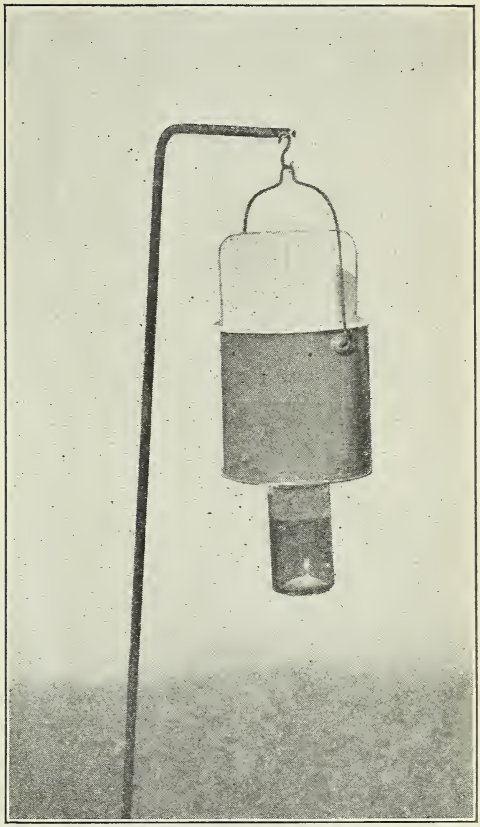

FIGURE 4.—Japanese-beetle trap suspended from a standard

Each trap should be emptied at least every other day to avoid decomposition of the insects. When jars which have no outlet in the bottom are employed, it is also necessary to empty them after a rain, as a considerable quantity of water will collect in them and will hasten the decomposition of any beetles present. The jars should also be washed occasionally because they will soon become dirty from beetle excrement and the odor will decrease the attractiveness of the bait. In addition, care must be taken to keep the trap and jar free from any odor save that of the bait, otherwise the beetle catch will be greatly diminished.

After beetles have been killed they should be disposed of as soon as possible. Whenever convenient, burying is a most satisfactory means of disposal. Burning, even with the aid of oil or kerosene,

does not entirely consume a considerable quantity of beetles, and the combustion is accompanied by a disagreeable odor. If the beetles are to be disposed of with trash they should be kept in a closed container unless they are to be carried away within a few hours after they have been killed.

Beetles killed with hot water have been fed to chickens with no apparent ill effects, but there is no information available on the value of dead beetles as food for poultry.

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